

EXPLORING EARTH'S MYSTERIES
...PROTECTING ITS FUTURE

BROOKHAVEN NATIONAL LABORATORY

1998
Site Environmental
Report

September 1999

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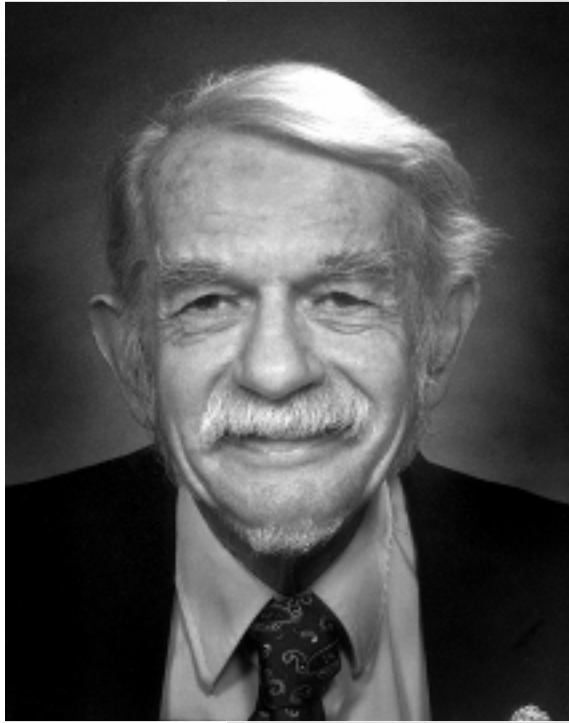
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Dedication

Andrew P. Hull, CHP
(1920-1999)

This Site Environmental Report is dedicated to Andrew Hull, who was a Certified Health Physicist at Brookhaven National Laboratory (BNL). Hull was devoted to the environment and the safe use of nuclear physics throughout the world. Born in Bristol, Connecticut, Hull became a health physicist after a career with American Airlines and a tour of duty in the U.S. Air Force during the Korean War. He received his bachelor's degree from Central Connecticut State College in 1956 and, on a fellowship from the Atomic Energy Commission, his master's degree in physics from Vanderbilt University in 1961. For the next 38 years he worked at BNL. From 1962 to 1981, Hull was responsible for the environmental monitoring program and for publishing the site environmental reports.

In addition to his BNL duties, Hull was one of the first health physicists to reach the Three Mile Island nuclear reactor accident in 1979 and was responsible for the analysis and interpretation of the environmental data that estimated population radiation doses. He was also called to the site of the Chernobyl Nuclear Power Plant accident in 1986 and helped determine the health and environmental impacts of that accident for the Department of Energy.

As a source of information, a mentor, and as friend of the environment, Andrew Hull will be missed.

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Executive Summary

For 50 years, the unique, leading-edge facilities at Brookhaven National Laboratory (BNL) have made many valuable scientific contributions possible. Today, BNL continues its research mission while paying close attention to protecting and cleaning up the local environment. The Laboratory's new environmental motto, "Exploring Earth's Mysteries ... Protecting Its Future," reflects a desire to balance world class research with operating in harmony with the natural environment.

ENVIRONMENTAL PROGRAMS AND EFFORTS

This Site Environmental Report is a summary of BNL's environmental performance. It is BNL's policy to integrate environmental stewardship into all facets of the Laboratory's missions. In 1998, BNL strengthened its environmental programs to ensure that it operates in a responsible manner that protects human health and the ecosystem. Major investments were made in four key programs:

- * The Upgrade of BNL's Environmental Management System. Improvements include the use of the International Standards Organization (ISO) 14001 standard as a framework, with added emphasis on assuring compliance with environmental requirements.

- * The Facility Review Project. This program provides an extensive examination of all previous and current buildings and equipment that have the potential to cause environmental damage, and furnishes remedies for any identified endangerment.

- * The Process Evaluation Project. This program is being used to create an integrated database that will be used to identify, track and address all potential or historical environmental concerns and issues related to facility operations.

- * The Groundwater Protection Program. Expansion of this program included the efforts in pollution prevention, monitoring, restoration and communications with the public.

Together, the programs provide effective tools for pinpointing and preventing condi-

tions that could harm the environment. They are described in more detail in Chapter 2.

BNL's aggressive Pollution Prevention Program is the keystone for all programs safeguarding the environment. It is being integrated into the planning, decision-making, and implementation phases of all site activities. Pollution prevention initiatives in 1998 resulted in declines of 11 tons of particulate emissions, 8.5 tons of nitrogen oxides, and 66.2 tons of sulfur dioxide; reductions in excess of 500 million liters per year of water used for cooling; elimination of the use of treatment chemicals at two water cooling towers; and other significant accomplishments. Chapter 2 has more information.

COMPLIANCE

BNL is subject to more than 50 sets of federal, state and local environmental regulations, 60 site-specific permits and a number of other binding agreements. BNL is committed to achieving and maintaining full compliance with these environmental requirements and agreements. In 1998, BNL operated in compliance with the majority of applicable regulations. Exceptions include nine minor exceedances of wastewater discharge permit limitations, and noncompliance with administrative provisions of the hazardous waste regulations. Corrective actions have been taken to address any issues noted. In order to meet Article 12 of the Suffolk County Sanitary code that regulates the storage and handling of toxic and hazardous materials, BNL permanently removed 26 storage tanks and retrofitted 31 tanks with containment systems in 1998. Other improvements that enhanced compliance this year (and for future years) include the upgrade of the Sewage Treatment Plant from primary to tertiary treatment facilities and the Spill Prevention Control Plan upgrade. Potable water met all standards. Chapter 3 gives more information about the environmental regulations affecting BNL operations and compliance.

In addition, BNL's operations and environmental protection programs were reviewed and audited extensively by a number of organizations in 1998. The New York State Department of Environmental Conservation and the Suffolk County Department of Health Services conducted compliance inspections; DOE local, regional and headquarters conducted audits and program reviews; and BNL conducted its own assessments. No significant compliance issues were identified.

ENVIRONMENTAL MONITORING AND RESULTS

In addition to groundwater monitoring, BNL's comprehensive monitoring program has hundreds of ambient and emission-point air monitoring stations and river water checkpoints. The monitoring system assesses environmental quality, ensures compliance with regulatory and permit conditions, and provides early detection of any condition requiring corrective action.

Over 5,000 samples of air, drinking water, surface water, groundwater, soil, flora and fauna were collected from hundreds of locations in 1998. Samples were analyzed for radiological parameters and organic and inorganic constituents. Improved wastewater management and reduced maintenance work within the High Flux Beam Reactor resulted in the lowest amount of tritium released to the Peconic River since measurements began in 1966. Analytical results showed that farm-grown vegetation remained unaffected by BNL activities. Due to historical environmental releases, local deer and fish continued to show somewhat elevated levels of BNL-related radionuclides, but at levels that continue to decrease with time. Both total air emissions and radiological air quality met Clean Air Act and DOE standards in 1998. Analytical results from groundwater monitoring wells located near most active facilities indicated that releases from current operations were within regulatory standards. However, groundwater monitoring did identify elevated tritium

concentrations near the Brookhaven Linac Isotope Producer. Following this discovery, corrective actions were immediately taken to prevent further impacts to groundwater quality.

Modeling of radioactive air emissions showed that the theoretical maximum public dose from the air exposure pathway was equal to only two percent of the limit established by the EPA's National Emission Standards for Hazardous Air Pollutants. Potential radiological doses from the routine consumption of fish and deer containing BNL-related radionuclides were calculated to be less than eight percent of the annual public dose limit specified by the DOE.

ENVIRONMENTAL RESTORATION

Six significant volatile organic compound (VOC) plumes and six radionuclide plumes exist in the groundwater underneath and downgradient of the BNL site as a result of historical spills and past operations. Efforts to monitor and cleanup the soil and groundwater contamination are managed under the Environmental Restoration Program. As part of BNL's extensive monitoring program carried out in 1998, 470 monitoring wells were sampled for a total of 1,750 individual sampling events, to verify that prevention and restoration activities are effective. During 1998, groundwater restoration activities resulted in the removal of approximately 222 kilograms (490 pounds) of volatile organic compounds (VOCs) and the treatment and return of approximately 2,800 million liters (740 million gallons) of groundwater in the Upper Glacial aquifer. As a whole, no significant change in contaminant concentrations occurred during the year. However, remediation systems are decreasing VOC concentrations located near the southern boundary of the site.

These strides forward reflect BNL's commitment to continually bettering its environmental performance through managerial emphasis as well as compliance efforts.

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